PM Challenge 2009

Independent Review in Action:

Adding Value to Orion through Independent Review

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Synopsis

This presentation will:

- Describe how rigorous integrated cost/schedule/technical/risk assessments by the Orion Standing Review Board (SRB) are adding value to the Orion Project.

- It will show how, working together, the Board and Project are ensuring that the assessment is constructive, high quality, and independent.

Background

- NASA's Constellation Program (CxP) returns humans to the moon and provides logistical support to the International Space Station (ISS). In the more distant future, it will also enable manned missions to Mars.

- The CxP is comprised of integration elements and chartered Projects:
  - ARES – Constellation Launch Vehicle
  - Orion – Crew Exploration Vehicle
  - Ground Operations
  - Mission Operations
  - Extra-Vehicular Activity (EVA)
  - Altair – Lunar Lander (pre formulation)

- To help ensure that America's next steps into space will be successful, NASA commissioned six CxP SRB's, one for each of the Projects (except Altair) and the sixth for the Program.

The Orion Project

- This Orion flight system is comprised of the following physical elements:
  - Crew Module
  - Service Module / Spacecraft Adapter
  - Launch Abort System (LAS)
- The Project is huge and complex requiring that it be well conceived, soundly planned, and properly executed
  - Project Management functions defined across entire agency
  - Unique internal/external visibility due to criticality of the mission and other long-term considerations (i.e. cost)
- The Project's challenge is amplified because NASA has not built a new major space transportation system in over 30 years.

Initial Charge to Orion SRB

- First CxP SRB Terms of Reference (ToR) was developed in February '07 based on agreements between projects/CxP/ESMD, OCE, and IPAO that tailored NPR 7120.5D implementation.
- Challenge was to efficiently adapt the human programs processes to the NPR 7120.5D SRB approach:
  - Give maximum access of SRB to "in-process" project reviews and
  - Utilize SRB/Orion project meetings for topical discussions as driven by SRB interests.
- SRB selection process was handled by IPAO.
- First overview briefing to the Orion SRB was conducted in Feb 2007 prior to Project SRR Board.
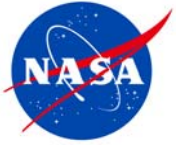
Makeup of Orion SRB

EPS	Gray Eng
Flight Operations & Human System Interface	Consultant
Propulsion	Consultant
Ground & Flight Software	LM
ICE	LaRC
Communications and Data Handling	JPL
Structures & Mechanisms	NESC
Mission Operations	Consultant
ECLSS, Health, and Habitation	Consultant
Safety and Mission Assurance	Consultant
Avionics	MEI Tech
Thermal Protection System	Sandia
Project Engineering Management and Launch Vehicle Integration	Lee & Assoc
Systems Engineering and Integration	Consultant
Ground Systems	Consultant
Program and Mission Strategy, Development, Planning, and Analysis	Consultant
Schedule Risk and SE&I	Consultant
GNC	JPL
Aerothermal, Flt Test	Consultant

The SRB

- Over the last two years, the SRB has conducted two comprehensive Key Decision Point (KDP) reviews, the
  - System Requirements Review (ESMD DPMC, July 2007)
  - System Definition Review / Preliminary-Non advocate Review (APMC, April 2008)
- Challenges for the SRB:
  – Assessments must be Constructive – looking for serious issues
  – Assessments must be High Quality – fact based and by experts
  – Assessments must be Independent – can't grade your own work
- Scope of Relationship between Project and SRB: Work together on internal reviews as observers, formal reviews as participants, and project requested assessments as participants.

The SRB Perspective

- We have a strong desire to make a contribution to the Project/Agency by performing comprehensive reviews of the Project's products and providing our inputs.

- The Project has highly qualified, conscientious, and energetic individuals, both managers and engineers.

- The Project has been open and candid in their dealings with us. They have offered us an opportunity to observe their work and internal reviews and have graciously and completely answered our questions and have taken our inputs seriously.

- The formal reviews have been responsive to our needs and specific requests. Their inputs are provided openly and discussions have been free, without defensiveness.

- The Project responded to our issues with competence and integrity, to the satisfaction of the Agency.

Inputs from the SRB

- Documents review (part of Project's Internal Review process) – comments on details and general quality to the Project.

- Internal Reviews –Request For Actions (RFAs) and/or Questions & Comments to the Project.

- Formal Reviews – Formal Report and Briefing w/report out to:

  - Project/Program

  - Center Management

  - ESMD Management

  - Agency Management

- Project Requested Assessments – Written report to the Project.

- Program Requirements Stability
- Technical Resources Management (mass, power, instrumentation, etc)
- Integrated Test processes and planning (including flight test program)
- Budget/schedule adequacy and confidence
- System-specific architecture and design
- Operability
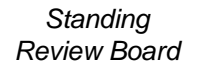- Program integration issues and concerns

- Timing: Some perception that SRB outbriefings that lagged project decisions became less useful to agency
  - SDR: Project Board in August 2007, Project briefing to SRB in December 2007, SRB report to Project in February 2008, APMC/KDP-B (SDR/PNAR) in April 2008.
  - Drivers:
    - Project: Major process changes to SDR to address criteria shortfalls (Mass) introduced a mass scrub that culminated in architecture reintegration and "rescoring" SDR internally in November 2008
    - SRB: Internal deliberations and processes take time. Particular challenge to implement Independent Cost Estimates during the time from project milestone completion to first SRB outbrief.

ORION SDR
with Additional Review Milestones

	CY2007						CY2008			
June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr

SRR ESMD PMC
7/16

**Orion
SDR Board**
8/30

**CPCB
POD Config**
11/1

SRB Reports
Proj/Proj
ICMC
ESMD DPMC

SDR/PNAR
APMC 4/29

SDR Kickoff

Orion Formal SDR

SDR Document Update

SRB Outbrief
12/4-12/7

SRB Assessment

SRB Reporting

ZBV

NASA Admin ZBV Status

Mass Scrub

Risk Balancing Round 1 Buyback

DP Devt

Integration

Round 2 Buyback

NASA Admin POD Results

Integration

**Architecture/Integration
Checkpoints**

Extension to allow
for better integration

CxP ISTIM

POD ERB

CPCB   ERB   CPCB
4/22

Orion DAC-2 (with 606c POD Config)

Orion Project SRB Experience

- Excellent technical insights from board members
  - SRB member observations and "stories" extremely helpful in steering the project
- Independent validation of management processes
  - All SRB concerns previously identified in project risk management process or otherwise highlighted routinely
  - SRB discussions have the effect of elevating priorities or improving the emphasis on issue resolution
    - Examples: failure tolerance, LOC/LOM, mass management
- Agency confidence
  - Objectivity and credibility of SRB reporting and project responses yield increased confidence by agency executives (A, AA(s), OCE, OSMA, ESMD, centers) in ability of project to execute
  - Should derive similar long-term benefits from the external stakeholders (i.e. OMB, CBO, GAO, OIG, NAC, ASAP, NAS, etc)